

## **Radiogene - The molecular genetics of radiation-induced changes at the gene, genome and transcriptome level in *Drosophila melanogaster* - The theme 1132**

Statement of the problem, research, and significance in the presented proposal of the project is innovative in the soundness of the challenge in the genetic risk estimation. Background of the prediction of the additional risk of genetic diseases in human populations exposed to ionizing radiation occurs naturally because of spontaneous mutations. The concept of radiation-inducible genetic diseases, which emerged around the environment, is based on two facts and an inference:

- (1) hereditary diseases result from mutations that occur in germ cells
- (2) ionizing radiation is capable to induce similar changes in all experimental systems, which are adequate to investigated into account of the project.

Modern research of the proposed problem requires a wide range of the main methods from molecular biology and the methods of condensed matter physics, and it does take to an account of all participants in the project in the JINR. Experience related to the planned years will be good in conclusions when expected results will be obtained in planned periods, and when will be the JINR organization is the best place for conducting and coordinating these studies among all other participate institutions in the present project. The results of structural changes in the gene, gene mutations and inhibited DNA changes in irradiated germline cell genome of the studied *Drosophila* present the main streams of planned research. Owing to the paucity of human data on radiation-induced mutations, animal data on radiation-induced mutations, are used to predict the risk of genetic diseases in humans using this type of method. Secondly, in the process of performing the above works and plans, the project will be studied the genetic control of the radiosensitivity of the *D. melanogaster* genome using lines that contrast in radiosensitivity.

The solver achievement is at first the group of precious specialists in the field of molecular radiobiology and radiation genetics. Next, they continue with genomic studies to detect the spectrum of inherited DNA changes in F1 offspring of *Drosophila* males irradiated by  $^{60}\text{Co}$   $\gamma$ -rays, sequence analysis of structural gene mutations, fish hybridization of radiation-induced structural gene mutations, study the transcriptomes of *Drosophila* lines with different radiosensitivity.

The researchers in the presented group plan to develop the software for automatized analysis and pro-analysis of the molecular data obtained by Sanger sequencing, the important part of such research. This type of sequencing is still considered the gold standard of sequencing technology today since it provides a high degree of accuracy, long-read capabilities, and the flexibility to support a diverse range of applications - both research and clinical. In this case, the project meets the required criteria for the scientific publishing and scientific presentations of originating results.

The project is considering the experiences of the research group related to planned years are on the good level and a large amount of the coordination of all planned experiments by the JINR organization is the right place for solving proposed radiobiological studies.

Planned timetable, the balance between the time frames and costs, description of the work plan, benefits for JINR arising from this activity, structure, and planned procedures are determined. The study of the radiation level risk using the technique of the gamma radiation facilities are also meaningful for the use and application of JINR's experimental facilities, as it regards obtaining the worldwide level of the research results at JINR.

The working group will be theoretically able to predict the potential human data on radiation-induced mutations, and the risk of genetic diseases in humans, this will be the successful strength of this project.

The project contains a small number of young professionals is the weakness of it and as well that not yet opened the collaborations with other institutions. The proposal is not meeting all relevant criteria of the Questionnaire for the extraordinary session of PAC, the project missing the invited presentations, the scientific school of this group does not qualify processes of doctorate study, and the full-time equivalent of the workload of researchers, engineers, technicians, laboratory assistants, and students was not noted.

Within the ranking scheme in the Questionnaire for the extraordinary session, I propose categorized this project to A and as a realizable project.

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In Bratislava, Slovak Republic: April 23, 2020